REMARKS

As an initial matter, Applicants address the Examiner's determination that Preliminary Amendment (A), filed February 15, 2001, contains new matter (Office Action, dated December 18, 2002, page 7, lines 1-14). First, the original specification describes "a nickel tube 20 m long" on page 26, line 10 describing ""Test Example 2." Therefore, it is not new matter to amend page 16, line 8, to describe this fact. Second, the amended description wherein "an upper limit of the film thickness is selected to be around 0.5 mm" corrects a typographical error on page 38, lines 10-11, and is fully supported on page 9, lines 18-20, of WO97/28085, filed on January 27, 1997 as International Application No. PCT/JP97/00188. Page 9, lines 18-20, of WO97/28025 states "XXXXXXXXXXXXXXXXXXXXX," the corresponding International Application No. PCT/JP97/00188 has been properly incorporated by reference in Preliminary Amendment (A) of the present case, filed on February 15, 2001. Therefore, in accordance with well-established patent practice, the international application provides justification to amend the specification to correct the typographical error on page 38 without adding new matter. See MPEP 608.01(p); In re Hawkins, 179 USPQ 157 (CCPA 1973); In re Hawkins, 179 USPQ 163 (CCPA 1973); In re Hawkins, 179 USPQ 167 (CCPA 1973). Third, the remaining changes deemed to be new matter have been removed from the application by the present amendment.

In accordance with the requirements of MPEP 608.01(p) and In re Hawkins, 179 USPQ 157 (CCPA 1973); In re Hawkins, 179 USPQ 163 (CCPA 1973); In re Hawkins, 179 USPQ 167 (CCPA 1973), I, Mr. Joerg-Uwe Szipl, the attorney of record for the

applicants, hereby declare by my signature below that the amendatory material presented as amendment No. 8 to the specification presented above consists of the same material incorporated by reference in the referencing application as identified in Preliminary Amendment (A), filed February 15, 2001, and that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. § 1001 and that such willful false statements may jeopardize the validity of the application or any patent issue thereon.

As another initial matter, Applicants address the Examiner's multiple objections to the drawings (see Office Action, dated December 18, 2002, page 5, line 1 to page 6, line 22). First, Figs. 46, 47, and 48 are not prior art. Fig. 46 is directed to experimental data collected when the water-generating reactor of Fig. 38, which is an embodiment in accordance with the present invention having a conventional platinum coated film, is used to generate water (see specification, page 12, lines 6-7, and page 49, line 23 to page 50, line 22). Figs. 47 and 48 are not prior art because they illustrate experimental data from using XPS analysis to investigate the causes of falling catalytic activity (specification, page 51, lines 9-13). The remaining minor informalities with the drawings are addressed in an attached paper in accordance with 37 C.F.R. 1.121(d).

The specification has been amended to correct several typographical errors and other minor informalities. Claim 56 has been canceled without prejudice. Claim 47 has been amended to incorporate the subject matter of claims 56 and to point out that the "reactor body" includes a "first reactor body member welded to a second reactor body

member," and that the "recesses" include a "first spherical recess having a first surface and a second spherical recess having a second surface," and that the "platinum coating film is disposed only on the surface of the first recess surface" as shown in Figure 49, and as supported on page 42, lines 12-18, page 44, lines 6-8, and page 53, line 3 to page 54, line 2. The phrase "catalyst material" and its accompanying description are removed from claim 47 because the "platinum coating film" is a catalyst. Claims 58-60 have been amended to depend upon claim 47. Claim 59 has also been amended to correct a typographical error.

New claim 81 has been added to claim the first and second reflector plates shown in Figures 43 and 49. Claim 82 has been added to claim a "filter in a filter retainer" as shown in Figures 43 and 49. Claim 83 has been added to describe additional relational details of the structure shown in Figures 43 and 49

The present amendment adds no new matter to the application.

The Invention

The present invention is directed to a water-generating reactor, such as might be used in semiconductor manufacturing facilites and other situations where there is a need to generate water. In particular, one embodiment in accordance with the present invention is a water-generating reactor that includes: (a) an inlet to receive hydrogen and oxygen; (b) an outlet to expel water; (c) a passage formed in the reactor, wherein the inlet is disposed at one end of the passage and the outlet is disposed at another end of the passage so that hydrogen and oxygen flows through the inlet and into the passage; (d) a reactor body made of a heat-resistant metal, the reactor body comprising a first reactor body member welded to a second reactor body member, wherein the inlet and the outlet are mounted on the

reactor body, the outlet is a water and moisture gas take-out joint, the passage is an internal space defined by recesses inside the reactor body, and the recesses include a first spherical recess having a first surface and a second spherical recess having a second surface; and (f) a platinum coating film is disposed only on the surface of the first recess surface, wherein when hydrogen and oxygen supplied by the inlet and diffused by the gas diffusing member contact the platinum coating film, water is generated from reactivity of the hydrogen and the oxygen.

Various other embodiments in accordance with the present invention are described in the dependent claims. The main advantage of the various embodiments of the water-generating reactor in accordance with the present invention is that high-purity water can be produced from hydrogen and oxygen. Furthermore, the platinum coating film provides a high catalytic activity while minimizing the formation of metal oxides; therefore, the platinum coating film remains stable over a long period of time because it is resistant to degradation by oxidation.

The Rejection

Claims 47, 56, 58-60 and 65 stand rejected under 35 U.S.C. 112, first and second paragraph, as lacking an adequate written description and for being indefinite.

Claims 47, 56 and 60 stand rejected under 35 U.S.C. 102(b) as anticipated by Japanese Document JP 4-54184 (hereafter, "JP'184 reference"). Claim 58 stands rejected under 35 U.S.C. 103(a) as unpatentable over the JP'184 reference. Claims 59 and 65 stand rejected under 35 U.S.C. 103(a) as unpatentable over the JP'184 reference in view of Japanese Document JP 52-111891 (hereafter, "JP'891 reference"). Claims 59 and 65

stand rejected under 35 U.S.C. 103(a) as unpatentable over the JP'184 reference in view of Japanese Document JP 6-122580 (hereafter, "JP'580 reference").

Claims 47, 56, 58-60 and 65 stand provisionally rejected under the judicially created doctrine of obviousness-type double patenting as unpatentable over claims 1-8 of co-pending Application No. 09/905,209 and over claims 1-8 of co-pending Application No. 10/096,247.

Applicants respectfully traverse the rejection and request reconsideration of the application for the following reasons.

Applicants' Arguments

In view of the present amendment, claims 47, 58-60 and 65 now comply with 35 U.S.C. 112. With respect to the Examiner's rejection under 35 U.S.C. 112, first paragraph, courts have held that the function of the written description requirement is to ensure that the inventor had possession of the claimed subject matter as of the date of filing, and that it is only necessary for the application to set forth the claimed subject matter so one skilled in the art will recognize that the applicant possessed the invention. In re Wertheim, 191 USPQ 90, 96 (CCPA 1976).

Figures 43 and 49 clearly show "recesses" (22a) and (23a) formed in the reactor body members (22) and (23). One skilled in the art would recognize from the specification and the drawings what is a "recess" and that the recesses have surfaces. The fact that the Examiner objects to the word "recess" is immaterial to a rejection under 35 U.S.C. 112, first paragraph, because the proper test is whether one of ordinary skill in the art would recognize the claimed subject matter from the description. Id. The Examiner has the initial burden of presenting evidence or reasons why persons skilled in the art would not

recognize in the disclosure a description of the claimed subject matter. Id. at 97. This the Examiner has not done.

Furthermore, the Webster's New Twentieth Century Dictionary (2nd ed.), page 1505, defines "recess" as "a receding or hollow place, as in a surface." Elements (22a) and (23a) shown in Figures 43 and 49 meet this definition. In fact, they could also be considered "indentations" using the definition provided by the Examiner.

With respect to claim 60, Applicants point out that the claim is definite because a ratio is dimensionless and any units of measurement drop out in the dimensional analysis of the ratio. Therefore, the Examiner's position (Office Action, dated December 18, 2002, page 9, lines 7-9) that claim 60 is indefinite for failing to specify measurement by weight, by volume, or by mole, is untenable and should be withdrawn because a ratio is a dimensionless element.

Applicants note the provisional obviousness-type double patenting rejection pending against claims 47, 56, 58-60, and 65 over claims 1-8 of co-pending Application No. 09/905,209 and claims 1-8 of co-pending Application No. 10/096,247. As neither of the co-pending applications have been allowed, the obviousness-type double patenting rejection is merely provisional. Therefore, Applicants choose to defer further comment on this issue until such time as the obviousness-type double patenting rejection is no longer provisional.

The JP'184 reference discloses a water generating reactor that includes a catalyst held by the molded member (6) placed inside the reactor vessel (1), and a heating conductor (7) heats the molded member (6) and the catalyst (see Figure 1). The JP'184 reference does not teach, or even suggest, the "first reactor body member welded to the

second reactor body member," the "first spherical recess having a first surface" and a "second spherical recess having a second surface," wherein the "platinum coating film is disposed only on the surface of the first recess" as recited in claim 47. The JP'184 reference also does not teach the first and second reflector plates recited in claim 81, or the "filter in a filter retainer" recited in claim 82.

The JP'891 reference discloses a "metal film" formed on the hardened surface of a base metal so that a hard metal film having a high melting point is formed on the metal surface (see English Abstract). The metal film may be formed by ion-plating, spattering, or TiC deposition to form a hard metal film of Mo, W, Cr, Ni, TiC or TiN (see English Abstract).

The JP'580 reference discloses the formation of a carbide layer (2) on a carbonaceous substrate (1) to improve the oxidation resistance of the carbonaceous material (see English Abstract). The carbide layer consists essentially of SiC, a thin film layer (3) made of TiC, and a thin-film layer (4) including a platinum group element (see English Abstract).

Courts have held that to justify a rejection under 35 U.S.C. 103, it must be shown that (1) the prior art would have suggested to those of ordinary skill in the art that they should make the claimed device, (2) the prior art revealed that in so making, those of ordinary skill would have a reasonable expectation of success, and (3) both the suggestion and the reasonable expectation of success must be founded in the prior art and not the Applicants' disclosure. In re Vaeck, 20 USPQ2d 1438, 1442. In the present case, the Examiner has not shown that the prior art would have suggested to those of ordinary skill in the art that they should make the presently claimed device by combining the teachings

of the JP'184 reference with either one of the JP'891 reference or the JP'580 reference for the following reasons.

The JP'891 reference teaches a process for hardening a metal surface. The reactor vessel (1) of the JP'184 reference receives hydrogen and oxygen gas (8), (9). There is nothing in the teaching of the JP'184 reference that would suggest a need to harden the metal surface of the reactor vessel (1), which only receives gases. Therefore, there is no proper suggestion in the JP'184 reference to justify applying the process of the JP'891 reference to harden the walls of the reactor vessel (1).

The JP'580 reference teaches the application of a carbide layer to improve the oxidation resistance of a carbonaceous substrate. There is nothing in the JP'184 reference to teach that the reactor vessel (1) has walls made of a carbonaceous substrate. In fact, the present specification teaches a reactor made of a heat-resistant metal (see claim 47). Therefore, there is no proper suggestion in the JP'184 reference that the reactor vessel (1) would be made of a carbonaceous substrate; therefore, there exists no reason taught by the prior art to form a carbide layer as taught by the JP'580 reference on the walls of the reactor vessel (1) disclosed by the JP'184 reference.

Conclusion

Claims 47, 58-60, 65, and 81-83 are in compliance with 35 U.S.C. 112. The rejection under 35 U.S.C. 102(b) is untenable and should be withdrawn because the JP'184 reference does not teach, or even suggest, the "first reactor body member welded to the second reactor body member," the "first spherical recess having a first surface" and a "second spherical recess having a second surface," wherein the "platinum coating film is

disposed only on the surface of the first recess" as recited in claim 47. Furthermore, the rejections under 35 U.S.C. 103 are untenable and should be withdrawn because the prior art does not provide a suggestion to combine the JP'184 reference with either one of the JP'891 reference or the JP'580 reference.

For all of the above reasons, claims 47, 58-60, 65, and 81-83 are in condition for allowance and a prompt notice of allowance is earnestly solicited.

Questions are welcomed by the below-signed attorney for applicants.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE SPECIFICATION:

1. Please replace the paragraph on page 2, lines 13-18, beginning with "In addition...," with the following new paragraph:

In addition, there is also a problem in that when gas flow rate is reduced, flames are generated in the vicinity of the nozzle, SiO_2 composing the quartz nozzle evaporates, and these volatile materials mix in a reactor atmosphere (H_2O +~~o~~+ O_2) and contaminate a gas (H_2O +~~+~~ O_2) fed to the semiconductor manufacturing equipment to such an extent that it can no longer be used for manufacturing high performance semiconductors.

2. Please replace the paragraph on page 3, lines 12-19, beginning with "A first point...," with the following new paragraph:

A first point is that because the mixture gas C of hydrogen and oxygen and argon is introduced into the reaction pipe 54, a reactivity degrades as compared with a case in which only hydrogen and oxygen are supplied, and as a result, the reactor size is increased. In particular, there is a case in which hydrogen or inert gas is added to water to adjust an oxidation-reduction power, and N_2-O, etc. are added to water in order to improve interface characteristics of Si and SiO_2, and in such event, an increase of the reactor size results in an increase of gas consumption rate, posing a serious problem from a standpoint of economy, etc.

3. Please replace the paragraph on page 10, lines 16-17, beginning with "Fig. 21 is...," with the following new paragraph:

Fig. 21 is a diagram showing a relationship between mixture-gas-flow rate and remaining O_2 in a case of a nickel filter (Test 3~~2~~);

4. Please replace the paragraph on page 18, line 21 to page 19, line 1, beginning with "That is, oxygen...," with the following new paragraph:

That is, oxygen gas O_2 is mixed with water spouted from the reactor 1, and the mixture gas of H_2O and O_2 is heated to ~~higher than~~ about 120°C by the heater 5a to prevent dew condensation of H_2O on pipe walls, and then supplied to the semiconductor manufacturing equipment 6.

5. Please replace the paragraph on page 25, lines 11-13, beginning with "In Fig. 14...," with the following new paragraph:

In Fig. 14, MFC0~~1~~-4 designate mass flow controllers, RP a vacuum pump, and T a tank. As a reactor 1, a nickel pipe (inner surface area 273 cm^2) 1/4 inch inside diameter and 2 m long is used.

6. Please replace the paragraph on page 32, line 24 to page 33, line 5, beginning with "Then, in order...," with the following new paragraph:

Then, in order to investigate the catalytic activity of the platinum coating layer, the inventors of this application carried out water generation tests by forming 300 - 400Å platinum coating film on both outer surfaces of a Ni thin sheet (0.1 mm thick x 5 mm wide x 50 mm long, surface area: about 10 cm^2), using ion sputtering equipment. As is shown in Figs. 36 and 37, a reactor is used which is constructed by inserting two pieces of Ni thin sheets N provided with the above mentioned Pt coating into a 1/4" Hastelloy pipe about 200 mm long, wherein 50 cc/min. of H_2 and 50 cc/min. of O_2 and 200 cc/min. of N_2 were fed into the inside of the reactor pipe from one end.

7. Please replace the paragraph on page 34, line 26 to page 35, line 5, beginning with "By analyzing the surface...," with the following new paragraph:

By analyzing the surface of the Pt coating film on the Ni thin sheet after catalytic activity is lost, causes of the sudden loss of catalytic activity of the Ni thin sheet with the Pt coating have been confirmed to be due to a temperature rise of the Ni thin sheet caused by reaction heat causing substrate metal (Ni) to diffuse into the Pt coating film, and this is oxidized in the Pt coating film by the oxidizing environment. As a result, when the platinum coating film is formed on the surface of the Ni thin sheet, as described above, there is a possibility of losing the catalytic activity, and therefore, the problem of its stability as a reactor remains.

8. Please replace the paragraph on page 38, lines 6-11, beginning with "In this test...," with the following new paragraph:

In this test example 6, the film thickness was designed to be about 250Å but it has been confirmed by test results that if the film thickness were 10Å or more, a specified reactivity (about 98% or more) can be obtained. In the case of a cladding process or hot press process, a comparatively thick film can be formed, but from the viewpoint of economy, an upper limit of the film thickness is selected to be around 0.5 mm.

9. Please replace the paragraph on page 40, lines 15-20, beginning with "In No. 2 test," with the following new paragraph:

In No. 2 test (test was started with H_2: 250 cc/min.; O_2: 250 cc/min., and reactor temperature adjusted at 120°C and the heater 19 was turned off midway), temperature d_2 of the gas inlet end portion of the reactor body member (flange) 13 rose by about 100°C and at the same time, temperature of the other portions exceeded the initial adjusted temperature of 120°C due to reaction heat generated, and the reactivity was 99.75%.

10. Please replace the paragraph on page 42, lines 12-14, beginning with "A recess 22a...," with the following new paragraph:

A recess 22a, whose bottom surface is spherical~~a plane~~, is provided inside one of the reactor body member 22, and a gas passage 24a of the gas supply joint 24, which is mounted on a rear surface, is in free communication with the recess 22a.

IN THE CLAIMS:

47. (Amended) A water-generating reactor comprising:

an inlet to receive hydrogen and oxygen;

an outlet to expel water;

a passage formed in the reactor, wherein the inlet is disposed at one end of the passage and the outlet is disposed at another end of the passage so that the hydrogen and oxygen flows through the inlet and into the passage;~~ and~~

~~a catalyst material disposed in the passage so as to contact hydrogen and oxygen in the passage, the catalyst material having catalytic action activating reactivity for hydrogen, or oxygen, or both hydrogen and oxygen~~

a reactor body made of a heat-resistant metal, the reactor body comprising a first reactor body member welded to a second reactor body member, wherein the inlet and the outlet are mounted on the reactor body, the outlet is a water and moisture gas take-out joint, the passage is an internal space defined by recesses inside the reactor body, and the recesses include a first spherical recess having a first surface and a second spherical recess having a second surface; and

a platinum coating film is disposed only on the surface of the first recess, wherein when the hydrogen and oxygen supplied by the inlet and diffused by the gas diffusing

member contact the platinum coating film, water is generated by a reaction between the hydrogen and the oxygen.

56. (Canceled)

58. (Amended) A water-generating reactor as recited in claim 47~~56~~, wherein the reactor body is made from heat-resistant metal, and the platinum coating film is 10Å to 0.5 mm thick and is formed by a method selected from the group consisting of a plating method, a sputtering method, a vapor deposition method, a cladding method, an ion plating method and a hot press method.

59. (Amended) A water-generating reactor as recited in claim 47~~56~~, wherein the reactor body is made from heat-resistant metal, and the platinum coating~~ed~~ film is a film 10Å to 0.5 mm thick formed on a barrier film of a non-metal material that is disposed on the surface of the first recess of the reactor body by one of a plating method, a sputtering method, a vapor deposition method, a cladding method, an ion plating method, or a hot press method.

60. (Amended) A water-generating reactor as recited in claim 47~~56~~, wherein when gas is supplied to the reactor body, the gas is an oxygen rich gas having a ratio of oxygen to hydrogen that is $< ½$, or a hydrogen rich gas having a ratio of oxygen to hydrogen that is $> ½$.

65. (Not amended) A water-generating reactor as recited in claim 59, wherein the barrier film is made of at least one material selected from the group consisting of TiN, TiC, TiCN, and TiAlN.

81. (NEW) A water-generating reactor as recited in claim 47, further comprising a first reflector plate disposed within the passage and at the inlet, and a second reflector plate disposed within the passage and at the outlet.

82. (NEW) A water-generating reactor as recited in claim 81, further comprising a filter in a filter retainer disposed in the passage, wherein the filter and the filter retainer are disposed between the first reflector plate and the second reflector plate.

83. (NEW) A water-generating reactor as recited in claim 47, wherein the platinum coating film is disposed only on the surface of the first recess, wherein the first recess is formed in the first reactor body member located at the outlet side of the passage.